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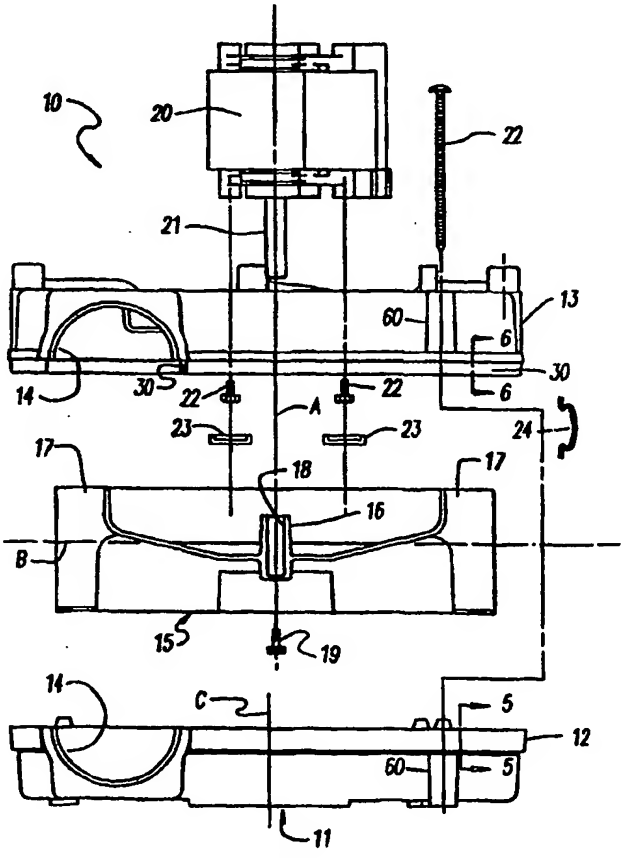
(54) Title: BLOWER HOUSING

(57) Abstract

A housing for a blower assembly comprising first (13) and second housing members (12), the first housing member has a sealing portion located at its periphery and the sealing portion includes a birfucated tongue (30) extending from the surface thereof. The second housing member has a sealing portion located at its periphery which corresponds to the sealing portion of the first housing member. The second housing sealing portion includes a groove in the surface thereof. The bifurcated tongue (30) and the groove (40) are fixed to create an interference fit therebetween when the first and second housing members are assembled, thereby sealing the periphery of the blower assembly. A securing means (24) for securing the first housing member to the second housing member.



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BLOWER HOUSING

Background of The Invention

This patent application relates generally to a housing for a blower assembly, and specifically to a housing incorporating a system for sealing the housing to prevent gasses or liquids from escaping from the interior of the housing or from corroding metal parts of the blower assembly and a system for conveniently and efficiently mounting the housing in an application.

Generally, plastic blower housings are formed by assembling two housing members. The housing, when assembled, directs air flow to and from desired locations. Sealing the two housing members, to prevent gasses or liquids from escaping from the interior of the blower, is necessary to achieve desired levels of air movement efficiency. Sealing may also be required for certain blower assembly applications. For example, sealing is necessary when the blower assembly is used to exhaust corrosive gasses from furnaces.

The efficiency of a blower assembly can be determined by comparing the volume of air movement to the amount of energy consumed in generating that air movement. One key factor in this measurement is the amount of flow lost due to leakage. Leakage will reduce the efficiency of the blower assembly. To reduce or eliminate such leakage, the two housing members must be sealed to prevent the escape of internal gasses from the blower housing. Efficiency can also be measured by comparing the volume of space occupied by the blower assembly to the volume of air moved by the blower.

Many applications for blower assemblies also require the housing to be sealed to prevent leakage and to protect corrosion sensitive subassemblies from the corrosive

products being moved or exhausted by the blower. For example, furnaces are often equipped with exhaust blowers that draw the combustion by-products through heat exchangers and exhaust the resultant gasses and condensation to a flu or vent. The by-products of combustion contain carbon monoxide, carbon dioxide, and are also corrosive. The cooling of the gasses, by drawing the gasses over heat exchangers, also creates corrosive condensation. The blower housing must be sealed to prevent the gasses and condensation from escaping uncontrolled.

In addition, the subassemblies of the blower assembly must either be corrosion resistant or protected from the corrosive environment. Common examples of such subassemblies include metal screws, bolts, nuts and motor shafts. Exposure of these metal parts to corrosives may result in significantly shortening the blower assembly life or catastrophic failure.

Several sealing techniques have been used in prior art devices. One such technique requires the application of silicone gel along the mating surfaces of two housing members prior to their assembly. In another technique, a channel is created in one housing member into which an oversized rubber seal is inserted. A portion of the rubber seal extends above the surface of the housing member and is compressed by the mating surface of the other housing member, thereby creating the seal. Yet another technique employs a tongue and groove arrangement where a tongue is loosely received in a groove and a rubber seal is pinched at the bottom of the groove by the tongue.

Each of these techniques is unsatisfactory. A common problem with the rubber seal is that over time the rubber loses its resiliency and therefore, the seal eventually fails. Similarly, the silicone gel has limited life and is difficult to apply. In addition, each of these methods increases the cost of the blower assembly by the cost of the rubber or silicone seal and by the increased assembly cost.

With respect to corrosive sensitive subassemblies, the prior art has resorted to using corrosive resistant materials such as stainless steel or other alloys for parts exposed to corrosive environments. However, stainless steel or other corrosive resistant alloys result in increased cost and difficulty in manufacturing.

Summary of The Invention

It is, therefore, an important object of this invention to provide a cost effective system for sealing a plastic blower housing.

Another object of this invention is to provide a corrosion resistant blower assembly.

Another object of this invention is to provide a high efficiency blower assembly.

Another object of this invention is to provide a convenient and efficient system for locating and mounting the blower assembly in its intended application.

In summary, there is provided a blower housing assembly comprising first and second housing members, an inlet, an outlet, an internal impeller, and an electric motor for driving the impeller. The first housing member has a bifurcated tongue extending from

the surface at its periphery, the second housing member has a corresponding groove extending into the surface at its periphery, the bifurcated tongue and the groove are sized to provide contact along the side walls of the tongue and groove when the housing members are assembled, thereby creating an effective seal. To further ensure effective sealing, the bifurcated tongue and the groove terminate prior to the end of the outlet of the blower housing, thereby preventing gasses or condensation from entering the groove and avoiding the seal. Still further enhancing the seal, are a plurality of removeably mounted caps covering the motor mounting holes and the corresponding fasteners used to secure the motor to the housing. In addition, the housing includes a plurality of bosses located in spaced relationship around the periphery of the housing, each boss having a hole therein for receiving a threaded fastener for mounting the housing in an application. The bosses are sized to threadably engage the threaded fastener so that it is retained by the housing in preparation of mounting the housing in an application. Moreover, at least one of the threaded fasteners protrudes from its respective hole to guide the alignment and location of the housing into its intended application.

The invention consists of certain novel features and a combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the details may be made without departing from the spirit, or sacrificing any of the advantages of the present invention.

Brief Description of The Drawings

For the purpose of facilitating an understanding of the invention, there is illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, the invention, its construction and operation, and many of its advantages should be readily understood and appreciated.

FIG. 1 is a expanded side view of the blower housing assembly incorporating the present invention;

FIG. 2 is a side view of the blower housing assembly in the assembled state;

FIG. 3 is a plan view of the inside of the first housing member;

FIG. 4 is a plan view of the inside of the second housing member;

FIG. 5 is an enlarged partial sectional view of the second housing member shown in FIG. 1 taken along lines 5-5.

FIG. 6 is an enlarged partial sectional view of the first housing member shown in FIG. 1 taken along lines 6-6.

FIG. 7 is an enlarged partial sectional view of the blower assembly shown in FIG. 2 taken along lines 7-7.

FIG. 8 is an enlarged partial sectional view of the first blower housing member shown in FIG. 12.

FIG. 9 is an enlarged sectional view of the cap shown in FIG. 1.

FIG. 10 is an enlarged partial sectional view of the second housing member shown in FIG. 4 taken along lines 10-10.

FIG. 11 is an enlarged partial sectional view of the first housing member shown in FIG. 3 taken along lines 11-11.

FIG. 12 is an alternative embodiment of what is shown in FIG. 8.

FIG. 13 is an alternative embodiment of what is shown in FIG. 9.

Detailed Description of The Preferred Embodiment

Referring to FIG. 1, there is shown a blower housing assembly. The blower housing assembly is generally designated by the number 10. The assembly 10 is formed when first housing member 13 and second housing member 12 are assembled together. The assembled housing includes an inlet 11, an outlet 14, and an electric motor 20 for driving an internal impeller 15.

First housing member 13 and second housing member 12 are of clam shell design. First housing member 13 includes an inlet 11 for drawing gasses into the housing, motor mounting location 28, and one half of the outlet 14 for exhausting gasses to a vent or exhaust conduit (not shown). Second housing member 12 includes the other half of the outlet 14 which corresponds to and mates with the outlet half of first housing member 13 when the housing members are assembled.

While in the preferred embodiment both housing members are of clam shell design, it is understood that the clam shell design is not necessary to the invention. In an

alternative embodiment, one housing member could be flat or of other suitable configuration. Moreover, it is not necessary to the invention that two housing members be used; in some applications the features and functions of the second housing member could be embodied in and performed by a bulkhead to which the first housing member could be attached.

Impeller 15 may be of conventional design and is adapted to be mounted onto motor shaft 21 of motor 20. Impeller 15 includes an axis of rotation, indicated by line A, and a plane of rotation, indicated by line B, which is perpendicular to the axis of rotation. Impeller 15 also includes a central disk 29 having a plurality of vanes 17 extending from disk 29 that are generally perpendicular to the plane of rotation. Impeller 15 further includes a hub 16 having a bore 18 therein. Bore 18 is adapted to receive motor shaft 21 for removeably mounting impeller 15 to motor 20. Impeller 15 may be secured to shaft 21 by any conventional means. In the preferred embodiment, impeller 15 is secured to shaft 21 by means of a threaded fastener 19 which threadably engages a threaded hole in the free end of shaft 21. The rotation of impeller 15 draws gasses into the housing through inlet 11 and forces gasses out of the housing through outlet 14.

The housing also includes a plurality of bosses 60 located in spaced relationship around the periphery of the housing. Each boss 60 has a hole 61 (FIGs. 3, 4) therein for receiving a housing mounting screw 22.

Referring to FIGs. 1 and 2, in the preferred embodiment, once housing members 12, 13 are assembled to one another, they are secured in mating relationship by a plurality

of non-corrosive spring clips 24. In addition, or, alternatively, threaded fastener 22 may be used to secure the first housing member 13 to the second housing member 12, as described more fully below.

Referring now to FIGs. 1, 3 and 6, FIG. 6 shows a cross-sectional view of the sealing portion of the first housing member 13. It can be seen that the perimeter of housing member 13 includes, at its periphery, a surface portion 34 having a bifurcated tongue 30 extending therefrom (FIG. 6). Surface 34 may be substantially flat. Tongue 30 is bifurcated including a first lobe 31 and a second lobe 32 separated by a generally V-shaped cutout which ends in a radius 35. Tongue 30 has side walls 33 extending from surface 34 to the end of each lobe 31, 32 respectively. Tongue 30 extends continuously around the periphery of first housing 13 beginning at one side of outlet 14 and ending at the other side of outlet 14 (FIG. 3). As can be seen, tongue 30 also extends around the periphery of bosses 60.

Referring to FIGs. 1, 4 and 5, FIG. 5 shows a cross-sectional view of the sealing portion of the second housing member 12. Included at the periphery of housing member 12 is a surface portion 44 having a groove 40 extending therein. Groove 40 includes side walls 41 ending in a radius 42. Surface 44 may be substantially flat.

Referring to FIGs. 2 and 7, it can be seen that the perimeter of the housing is sealed to prevent the internal gasses from escaping therefrom. The seal is accomplished by inserting tongue 30 into groove 40. The tongue 30 and groove 40 are sized to create an interference fit between the side walls 33 of the tongue 30 and the side walls 41 of the

groove 40. The interference fit ensures that the side walls of the tongue 30 and groove 40 maintain contact over substantially the entire length of the side walls 33 of the tongue 30.

In the preferred embodiment, the width of base portion 36 of tongue 30 is sized to be no less than the width of base portion 43 of groove 40. Similarly, the angle created by the converging side walls 33 of tongue 30 when uncompressed is less than the angle created by the diverging side walls 41 of groove 40. This ensures contact between the side walls 33 of the tongue 30 and the side walls 41 of groove 40 along substantially the entire length of tongue 30. This contact creates an effective seal and prevents gasses on the inside of the housing from escaping therefrom.

Referring to FIGs. 6 and 7, bifurcated tongue 30 has two separated lobes 31, 32 in its unrestricted or uncompressed state (FIG. 6). However, when tongue 30 is inserted into groove 40, lobes 31, 32 are forced together (FIG.7). As side walls 33 come into contact with side walls 41, lobes 31, 32 are forced towards one another. The further into groove 40 tongue 30 is inserted, the more lobes 31, 32 are forced together. Contact between side walls 33 and side walls 41 is maintained, in part, by the elastic memory of lobes 31, 32 which naturally forces lobes 31, 32 away from one another and, consequently, into side walls 41 thereby enhancing the seal.

In an alternative embodiment, a plurality of separate tongues (not shown) could be used, replacing the bifurcated tongue 30.

Another alternative embodiment includes, the width of base portion 36 of tongue 30 being greater than the width of base portion 43 of groove 40. Similarly, the angle

created by the unrestricted converging side walls 33 of tongue 30 can be greater than the angle created by the diverging side walls 41 of groove 40. This will still achieve contact between side walls 33, 41 over a substantial length of tongue 30. Such an alternative arrangement will still create an effective seal.

It can be seen in FIG. 7 that surface 34 of first housing member 13 and surface 44 of second housing member 12 are spaced apart when the housing members 12, 13 are assembled. This allows the seal to respond to variations in temperature or other atmospheric conditions. In the preferred embodiment, housing members 12 and 13 are attached to each other by means of resilient, non-corrosive, spring clips 24, as shown in FIG. 7. Spring clips 24 apply constant pressure upon housing members 12 and 13 forcing them together. If the atmospheric conditions vary causing the surface contact between tongue 30 and groove 40 to decrease, the constant pressure applied by spring clip 24 and the space between surfaces 34 and 44 will allow and indeed force tongue 30 further into groove 40 thereby ensuring an effective seal of the perimeter of the housing.

Referring to FIGs. 3 and 4, it can be seen that tongue 30 and groove 40 terminate prior to the end of the outlet 14. It has been discovered that in applications where the outlet 14 of the blower assembly 10 is connected to a conduit of sufficient length to create head pressure, the gasses and corrosive by-products of combustion can be forced, by the head pressure, into the groove 40 and thereby by-pass the seal and escape from the housing. To prevent this, the preferred embodiment terminates the tongue 30 and groove

40 prior to outlet 14 thereby preventing the exhausted gasses and by-products from entering the groove 40.

Referring to FIGs. 1, 8, 9 and 12, the first housing member 13 further includes a system for sealing and protecting the threaded fasteners 22 securing motor 20 to first housing member 13. In the preferred embodiment, a circular disk-shaped cap 75 is removealby secured to the inside surface 37 of first housing member 13 to seal the motor fasteners 22 from the corrosive environment (FIG. 3). The inside surface 37 of housing member 13 includes a plurality of recessed portions 70 having side walls 71 and bottom 73. Centered in each respective recessed portion 70 and passing through each respective bottom 73 is holes 25 for mounting the motor 20. Threaded fasteners 22, such as bolts, are used to removeably secure the motor 20 to housing 13. The heads of the fasteners 22 are received within the recessed portion 70 making contact with bottom 73. Side wall 71 has a circumferential ridge 74 extending parallel to bottom 73. The cap 75 has an edge 76 which includes a groove 77 extending around the edge 76 for engaging the ridge 74. When ridge 74 and groove 77 are matingly engaged, cap 75 is secured to housing 13 and fasteners 22 are sealed from the internal environment and its corrosives.

In another embodiment, a cup-shaped cap 50 is removeably secured to the inside surface 37 of first housing member 13 to seal from the corrosive environment the fasteners 22 (FIG.13). Cap 50 comprises a circular disk of cup-shaped cross-section having an inside defined by side wall 51, top 54 and feet 53. The side wall 51 angles slightly

outwardly from top 54 towards base 53. Located on side wall 51, and extending around the circumference thereof, is a V-shaped rib 52.

Referring to FIGs. 1 and 4, it can be seen that second housing member 12 has an inlet 11 therein. Inlet 11 can be of any shape, but is typically round as in the preferred embodiment of the present invention. Inlet 11 has a centerline (line C) that is perpendicular to the plane of rotation (line B) of impeller 15. In the preferred embodiment, inlet centerline is parallel to but spaced away from the axis of rotation (line A) of impeller 15 which is defined by the axis of motor shaft 21.

In an alternative embodiment, the periphery of housing member 12 is helical having a centerline thereof. The center of inlet 15 is aligned with the axis of rotation (line B) of impeller 15, but is not aligned with the centerline of the helical periphery of housing member 12.

Either embodiment, allows the blower assembly 10 to be used in applications that otherwise might have obstructions preventing the use of a blower assembly having an inlet centered in the housing or aligned with the axis of rotation. The present invention yields greater flexibility in using the blower assembly 10.

Referring to FIGs. 1, 3, 10 and 11, each housing member 12, 13 include a plurality of bosses 60 located around the periphery of each housing member 12, 13 (FIGs. 3, 4). Within each boss 60 is a hole 61 adapted to receive a threaded fastener 22, such as a self-tapping threaded screw. In the preferred embodiment, the diameter of each hole 61 is constant in first housing member 13 is and is sized to allow fastener 22 to pass

therrethrough unrestricted. In contrast, in second housing member 12, each hole 61 includes two parts; a first part 62 and a second part 63. First part 62 has a tapered diameter beginning with a diameter corresponding to the diameter of hole 61 in the first housing member. The first part 62 continues until hole 61 has a constant diameter; the second part 63. The diameter of the second part 63 is sized to engage the outside diameter of the threaded fastener 22 thereby retaining it in the housing assembly 10 and preventing the loss of fastener 22.

Referring to FIG. 2, it can be seen that a fastener 22 protrudes from the bottom of housing member 13. In the preferred embodiment, at least one of the respective fasteners 22 protrudes from housing member 12 to facilitate locating, aligning and mounting of the blower assembly in its intended application. In addition, fastener 22 may be used to secure first housing member 13 to second housing member 12.

While the foregoing description has been in respect to a system for sealing a blower housing, it is to be understood that the same principles would be applicable to other housings.

What has been described therefor is an improved system for sealing a plastic blower housing assembly. The improved sealing system provides a seal with longer life and lower maintenance, that is resistant to temperature and atmospheric variations and that is less expensive to produce. In addition, an improved mounting and aligning system has been described. Finally, an improved air intake system has been described allowing greater flexibility and efficiency in using the blower assembly of the present invention.

While the preferred embodiment of the present invention has been described, it is understood that the scope of the invention is defined by the following claims.

What I claim is:

1. A housing for a blower assembly comprising:

first and second housing members, said first housing member having a sealing portion located at its periphery, said sealing portion including a bifurcated tongue extending from the surface thereof, said second housing member having a sealing portion located at its periphery and corresponding to said sealing portion of said first housing member, said second housing sealing portion including a groove in the surface thereof, said bifurcated tongue and said groove sized to create an interference fit between said tongue and groove when said first and second housing members are assembled, thereby sealing the periphery of said blower assembly and securing means for securing said first housing member to said second housing member.

2. A housing for a blower assembly as claimed in claim 1 wherein said bifurcated tongue includes side walls that diverge towards a base portion located at said surface of said sealing portion of said housing member, said groove includes side walls that diverge towards a base portion located at said sealing surface of said housing member and said base portion of said groove having a width no greater than the width of said base portion of said bifurcated tongue.

3. A housing for a blower assembly as claimed in claim 2 wherein the angle created by said side walls of said bifurcated tongue is less than the angle created by said side walls of said groove.

4. A housing for a blower assembly as claimed in claim 2 wherein said side walls of said bifurcated tongue and said side walls of said groove are in contact over substantially the entire length of said side walls of said tongue.

5. A housing for a blower assembly as claimed in claim 2 wherein said bifurcated tongue has a first lobe and a second lobe and said diverging side walls of said groove compress said first and second lobes towards one another when said side walls of said bifurcated tongue engage said groove.

6. A housing for a blower assembly as claimed in claim 1 wherein said sealing portion of said housing members comprises a flat surface portion, said flat surface portion of said first housing member includes a bifurcated tongue extending therefrom, said flat surface portion of said second housing member includes a groove extending therein and said bifurcated tongue being compressed by said groove when said first and second housing members are assembled, thereby sealing the blower assembly.

7. A housing for a blower assembly as claimed in claim 6 wherein said flat surface portion of said first housing member and said flat surface portion of said second member are spaced apart from one another when said housing members are assembled.

8. A housing for a blower assembly as claimed in claim 7 wherein said housing members are formed of plastic material.

9. A housing for a blower assembly comprising:

a first and a second housing member, a rotating impeller for creating airflow within said blower assembly, said impeller having an axis of rotation and a plane of rotation perpendicular to said axis of rotation, said first housing member having an inlet aperture therein and a sealing portion located at its periphery, said inlet aperture having a center point defining an axis perpendicular to said plane of rotation, said aperture axis being spaced away from said axis of rotation, said sealing portion including a tongue extending from the surface thereof, said second housing member having a sealing portion located at its periphery and corresponding to said sealing portion of said first housing member, said second housing sealing portion including a groove in the surface thereof, said tongue and groove sized to create an interference fit between said tongue and groove when said first and second housing members are assembled, thereby sealing the periphery

of said blower assembly and securing means for securing said first housing member to said second housing member.

10. A housing for a blower assembly comprising:

a first housing member and a second housing member, said first housing member having a helical outer periphery, said helical outer periphery having a center, said first housing member including an inlet aperture having a center, said helical periphery center and said inlet center being spaced apart and an impeller for moving air having an axis of rotation.

11. A housing for a blower assembly as claimed in claim 10 wherein said axis of rotation of the impeller is aligned with said center of the helical periphery.

12. A housing for a blower assembly as claimed in claim 10 wherein said axis of rotation of the impeller is aligned with said center of the inlet aperture.

13. A housing for a blower assembly comprising:

a first housing member and a second housing member, means for securing the periphery of said first housing member to the periphery of said second housing member, and means for mounting said secured housing members, wherein said mounting means and said securing means are the same.

14. A housing for a blower assembly as claimed in claim 13 wherein said mounting and securing means comprises: said first housing member having a plurality of first holes therein, said first holes being spaced around the periphery of said first housing member, said second housing member having a plurality of second holes therein spaced around the periphery of said second housing member and corresponding to said first holes, a plurality of threaded fasteners respectively passing through each of said first holes and threadably engaging each of said respective second holes to secure said first housing to said second housing.

15. A housing for a blower assembly as claimed in claim 14 wherein said plurality of threaded fasteners are self-threading screws.

16. A housing for a blower assembly as claimed in claim 13 wherein said first housing includes a plurality of first bosses having said first holes therein and begin spaced around its periphery, said second housing includes a plurality of second bosses having said second holes therein and being spaced around its periphery and corresponding to said first bosses, said second holes having a diameter less than the diameter of said first holes, and each of said threaded fasteners engaging said respective second hole to secure said first housing member to said second housing member.

17. A housing for a blower assembly as claimed in claim 16 wherein said second hole is tapered.

18. A housing for a blower assembly as claimed in claim 16 wherein at least one of said threaded fasteners protrudes from said second housing for locating said assembly in its intended application.

19. A housing for a blower assembly comprising:

a plurality of holes located around the periphery of the housing for receiving a plurality of threaded fasteners, at least one of said threaded fasteners extending completely through and protruding from its respective said hole for aligning said housing with a mounting surface, and a means for retaining each said threaded fastener in its respective said hole.

20. A housing for a blower assembly as claimed in claim 19 wherein each of said holes has an entrance end and an exit end and each of said holes being tapered from its entrance end to its exit end so that each respective said threaded fastener passes freely through said entrance end and threadably engages the walls of said hole at said exit end.

21. A housing for a blower assembly as claimed in claim 19 wherein each of said holes has a diameter sized so that each respective said threaded fastener engages the walls of said holes.

22. A housing for a blower assembly comprising:

a first housing member and a second housing member, said second housing member having an inside surface and a motor mounting surface, said first and second housing members defining an inside and an outside of the housing when assembled, said second housing member having a plurality of holes therein for mounting a motor thereto, a motor and a plurality of securing means for securing said motor to said second housing member, a second securing means for securing said second housing member to said first housing member, means for sealing said first and second housing members together; and a means for sealing said plurality of motor securing means from the inside of the blower assembly.

23. A housing for a blower assembly as claimed in claim 22 wherein said plurality of motor securing means comprise a plurality of threaded fasteners.

24. A housing for a blower assembly as claimed in claim 22 wherein said sealing means comprises:

a plurality of caps removeably attached to said inside surface and corresponding to each respective securing means, each said cap having a cupped shaped cross-section, and a means for attaching said caps to said inside surface.

25. A housing for a blower assembly as claimed in claim 24 wherein said means for attaching said caps comprises:

said cap having an internal diameter defined by a side wall of said cap, a groove extending around the internal circumference of said side wall of said cap, a circular raised rib extending upwardly from said inside surface of said second housing and around each said motor mounting hole having an outside diameter corresponding to said internal diameter of said cap, a circumferential ridge extending parallel to said inside surface from said upwardly extending rib, said ridge having a height corresponding to a depth of said groove, and said ridge being sized to mate with said groove when assembled to removeably attach said cap to said second housing.

26. A housing for a blower assembly as claimed in claim 25 wherein said side wall of said cap mates with said raised rib when assembled, thereby sealing said motor mounting hole.

27. A housing for a blower assembly as claimed in claim 25 wherein said ridge mates with said groove when assembled, thereby sealing said motor mounting hole.

28. A housing for a blower assembly as claimed in claim 22 wherein said inside surface includes a plurality of recessed portions concentrically located with said plurality of motor mounting holes, said recessed portions having a side wall, said side wall having a ridge extending therefrom, a cap for mating with said recessed portion to seal said motor securing means from the inside of said housing, said cap having a shape corresponding to said recessed portion and including a side wall having a groove therein whereby said groove mates with said ridge to attach said cap to said first housing member.

29. A housing for a blower assembly as claimed in claim 28 wherein said cap is generally circular.

30. A housing for a blower assembly as claimed in claim 28 wherein the mating of said ridge and said groove seal said motor securing means from the inside of said housing.

31. A housing for a blower assembly as claimed in claim 28 wherein said side wall of the cap and said side wall of said recessed portion mate thereby sealing said motor securing means form the inside of said housing.

32. A housing for a blower assembly comprising:

said housing having an exterior wall and an interior wall, said exterior wall defining the periphery of said housing, a plurality of bosses located in spaced relationship around said periphery, each said boss having a hole therein, said hole being generally parallel to said exterior wall, and at least one of said holes being tangent to said interior wall.

33. A housing for a blower assembly comprising:

said housing having an exterior wall and an interior wall, said exterior wall defining the periphery of said housing, a plurality of bosses located in spaced relationship around said periphery, each said boss having a hole therein, said hole being generally parallel to said interior wall and spaced away therefrom by a predetermined distance wherein at least one said predetermined distance is no less than three thousandths of an inch.

34. A housing for a blower assembly comprising: a first housing member and a second housing member, said first housing member having a sealing portion located at its periphery, said sealing portion including a plurality of tongues extending from said sealing portion, said second housing member having a sealing portion located at its periphery, said second housing sealing portion including a groove therein for receiving said plurality of tongues, said plurality of tongues being forced towards

one another when said tongues are inserted into said groove and a securing means for securing said first housing member to said second housing member.

35. A housing for a blower assembly as claimed in claim 34 wherein said groove has side walls that converge ending in a radius, said plurality of tongues contacting said side walls when said tongues are inserted into said groove, whereby the contact between said converging side walls and said tongues seals the periphery of said housing assembly.

36. A housing for a blower assembly as claimed in claim 35 wherein the outermost tongues in said plurality of tongues have side walls and said side walls define an angle, said angle being less than an angle defined by the converging side walls of said groove.

37. A housing for a blower assembly as claimed in claim 34 wherein said sealing portion of said first and second housing members includes a flat surface, said flat surface of said first housing member having a plurality of tongues extending therefrom, said flat surface of said second housing member including a groove therein for receiving said tongues, said plurality of tongues sealing said housing when inserted into said groove.

38. A housing for a blower assembly comprising:

a housing member having a sealing portion located at its periphery, said sealing portion including a tongue for mating engagement with a groove, said tongue and said groove being sized to create an interference fit therebetween.

39. A housing for a blower assembly as claimed in claim 38 wherein said tongue is bifurcated.

40. A housing for a blower assembly comprising:

first and second housing members, said first housing member having a sealing portion located at its periphery, said sealing portion including a bifurcated tongue extending from the surface thereof, said second housing member having a sealing portion located at its periphery and corresponding to said sealing portion of said first housing member, said second housing sealing portion including a groove in the surface thereof, said bifurcated tongue and said groove sized to create an interference fit between said tongue and groove when said first and second housing members are assembled thereby sealing the periphery of said blower assembly, securing means for securing said first housing member to said second housing member, a rotating impeller for creating airflow within said blower assembly, said impeller having an axis of rotation and a plane of rotation perpendicular to said axis of rotation, said first housing member having an inlet aperture therein and a

sealing portion located at its periphery; said inlet aperture having a center point defining an axis perpendicular to said plane of rotation; said aperture axis being spaced away from said axis of rotation.

41. A housing for a blower assembly as claimed in claim 40 wherein said first housing member has a plurality of first holes therein, said first holes being spaced around the periphery of said first housing member, said second housing member having a plurality of second holes therein spaced around the periphery of said second housing member and corresponding to said first holes, a plurality of threaded fasteners respectively passing through each of said first holes and threadably engaging each of said respective second holes to secure said first housing to said second housing.

42. A housing for a blower assembly as claimed in claim 41 wherein at least one of said threaded fasteners protrudes form said second housing for aligning said assembly in its intended application.

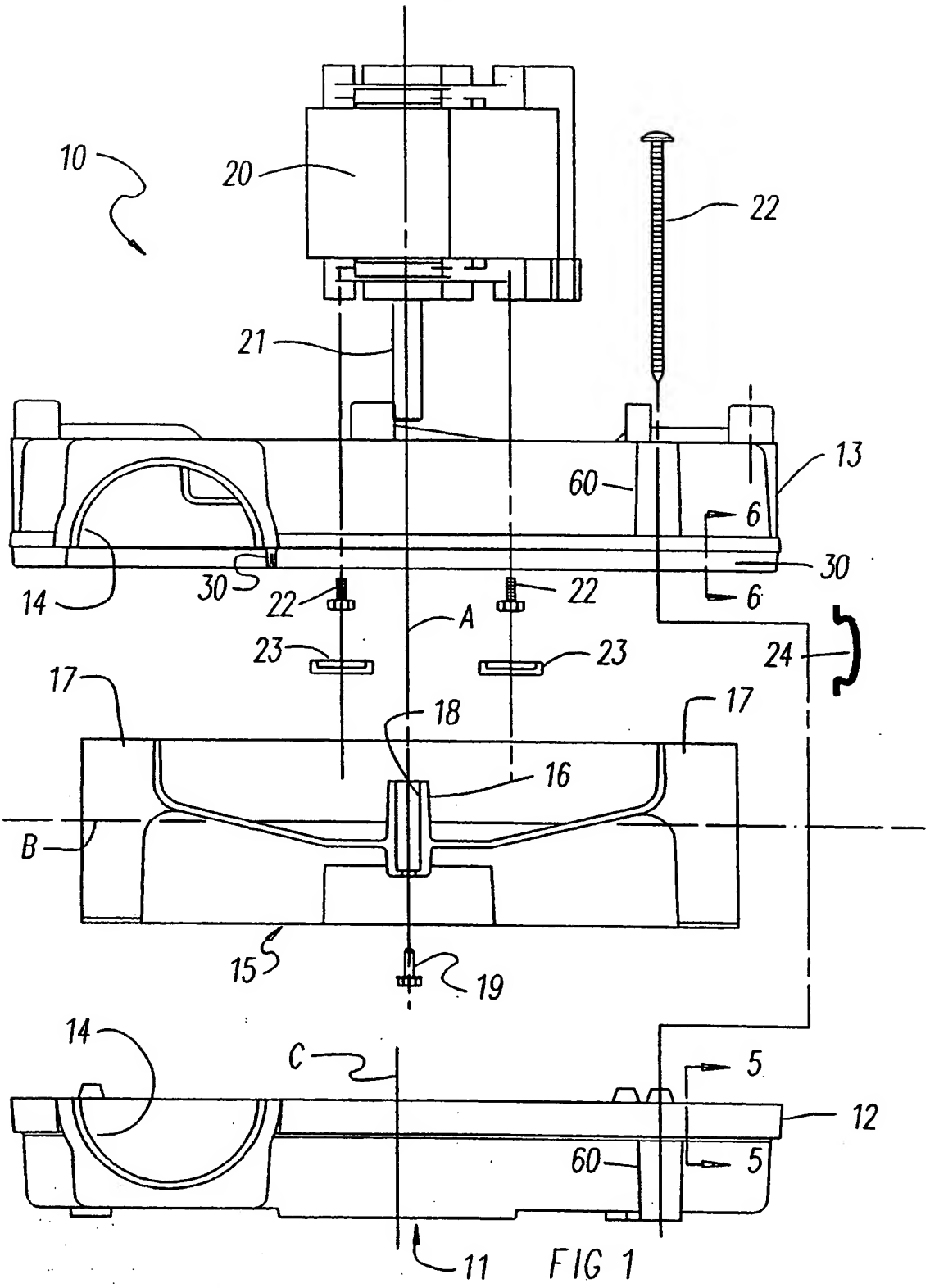

FIG 1

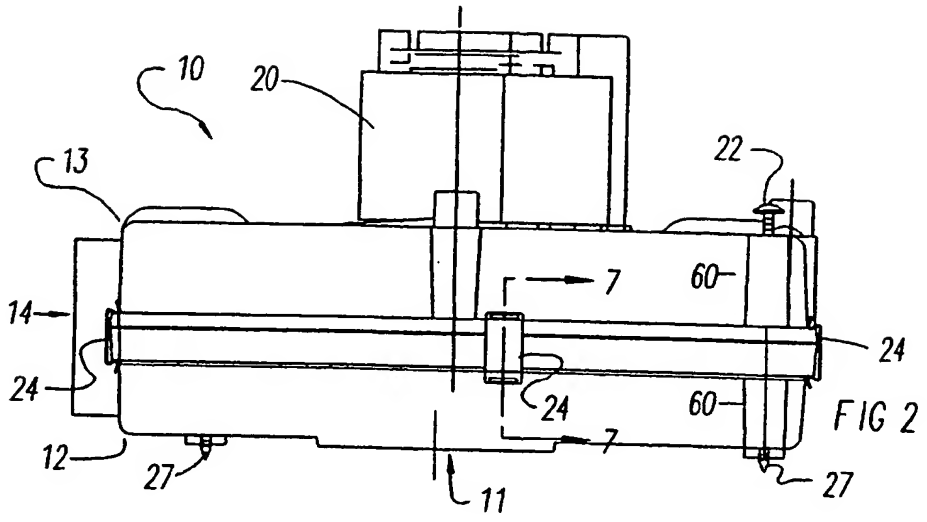

FIG 2

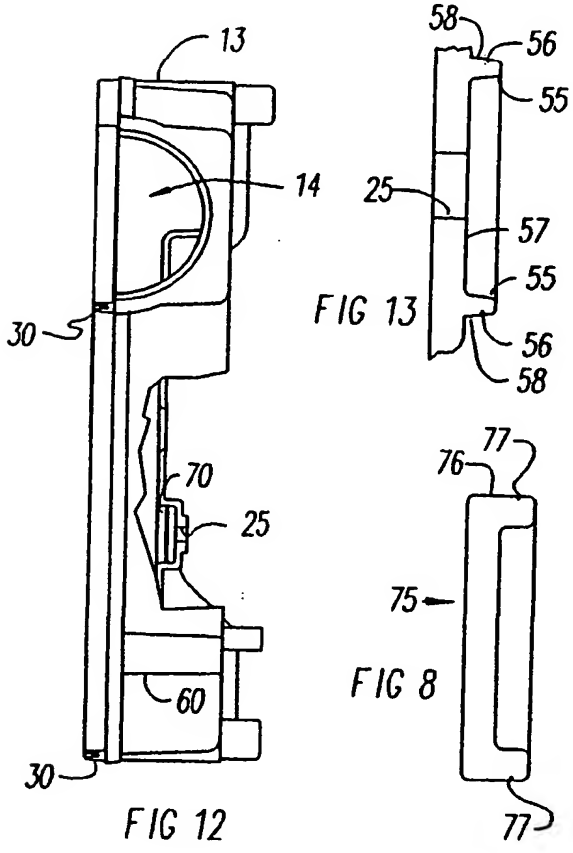

FIG 12

FIG 13

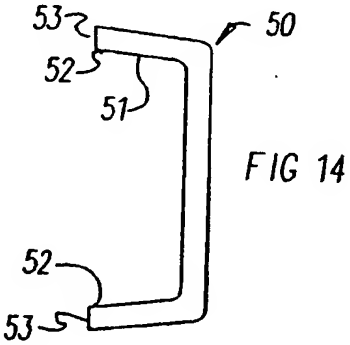

FIG 14

FIG 8

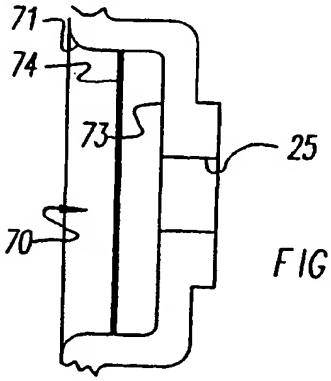

FIG 9

FIG 3

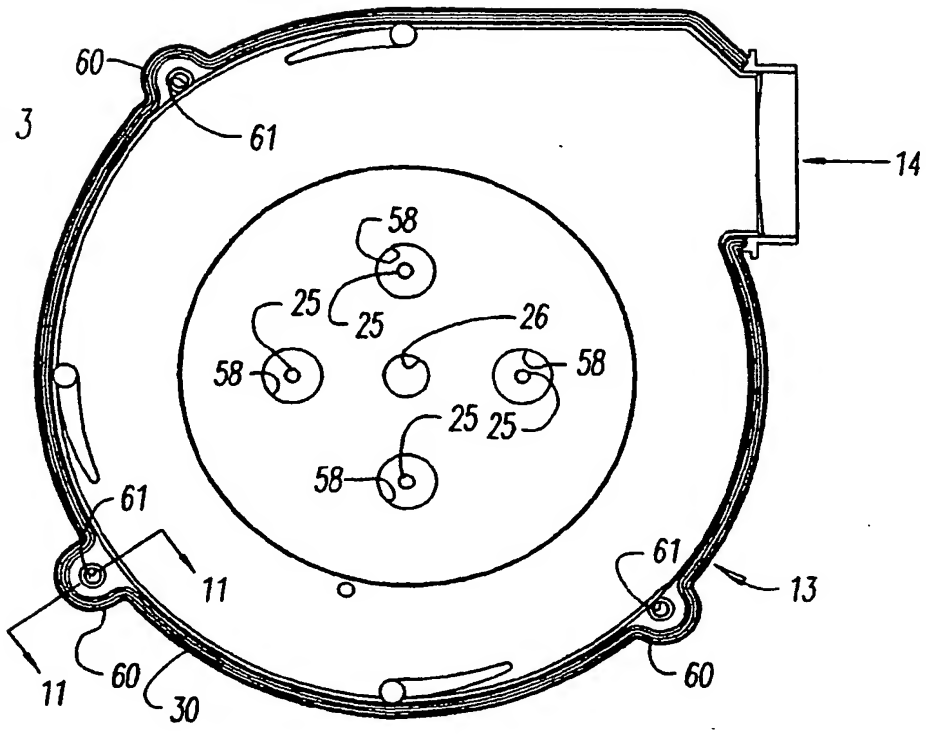

FIG 4

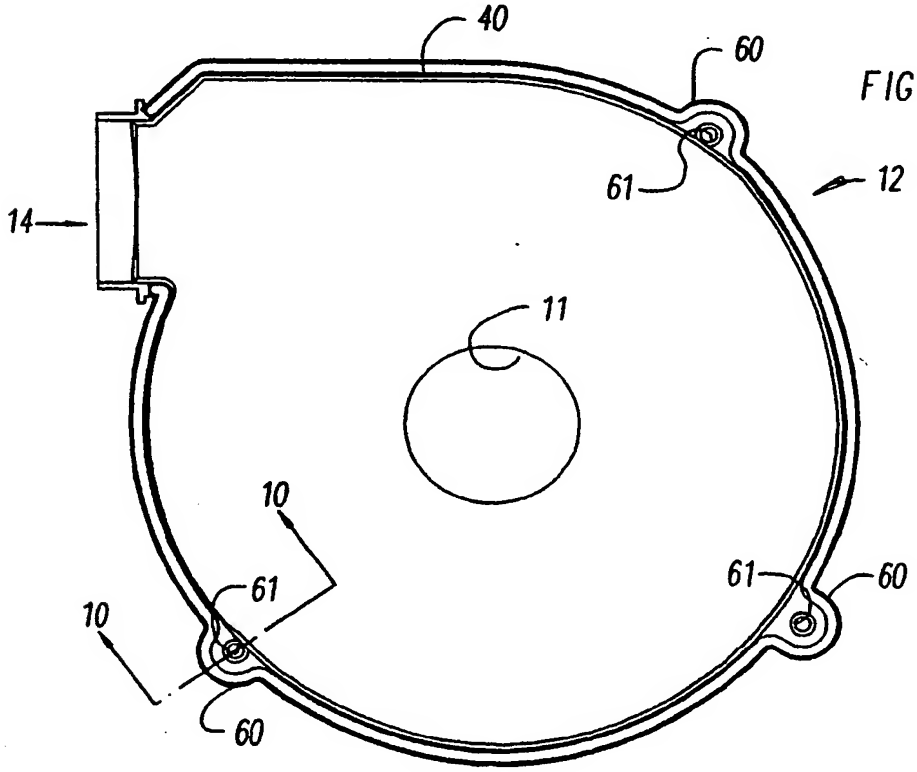

FIG 5

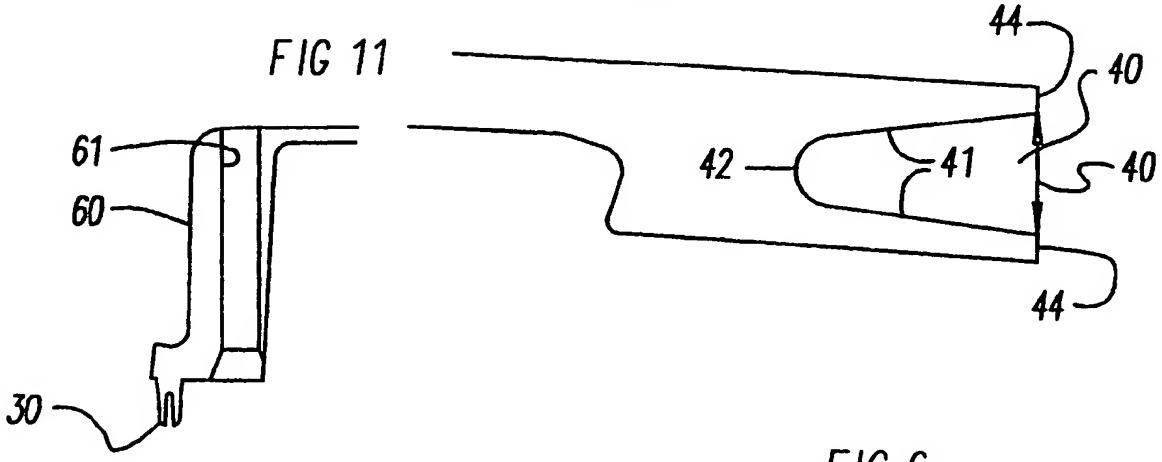

FIG 11

FIG 6

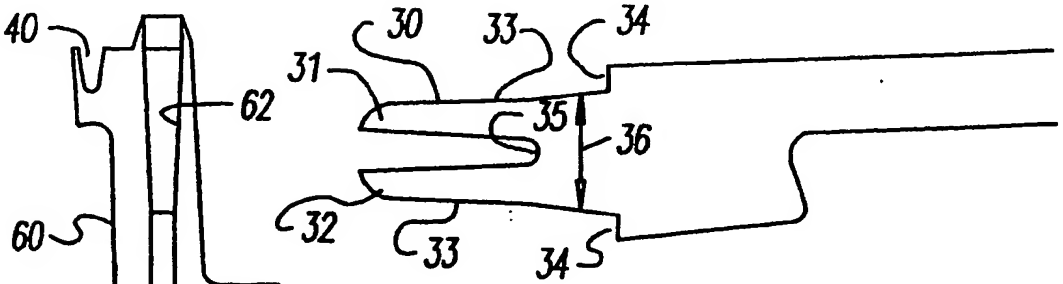

FIG 10

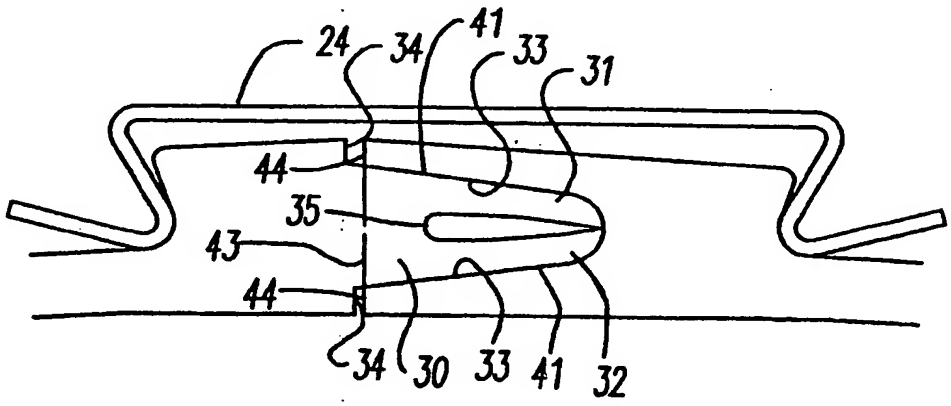

FIG 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/06925

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :F04D 29/44
US CL :Please See Extra Sheet.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 415/170.1, 182.1, 206, 213.1, 214.1; 277/205; 403/13, 14, 312, 334, 335, 337.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
None

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
None

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	U.S., A, 2,879,092 (HARGROVE ET AL) 24 MARCH 1959, Fig. 2	9, 10, 16, 22, 32, 33,
Y	U.S., A, 3,824,028 (ZENKNER ET AL) 16 JULY 1974, Fig. 11	32-37, 40-42
Y	U.S.,A, 4,386,868 (BLUVER ET AL) 07 JUNE 1983, Figs. 1-3	13-21
Y	U.S., A, 4,396,309 (MCCORMICK) 02 AUGUST 1983, Figs. 1-2	13-21
Y	U.S., A, 4,735,551 (SCHILLING) 05 APRIL1988, Fig. 1	32-37, 40-42
Y	U.S., A, 4,865,517 (BEEHLER) 12 SEPTEMBER 1989, Fig. 4	13-21

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search
21 AUGUST 1995

Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/06925

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	U.S., A, 5,050,764 (VOSS) 24 SEPTEMBER 1991, Figs. 1-6	13-21
Y	U.S., A, 5,141,397 (SULLIVAN) 25 AUGUST 1992, Figs 1-16	1-42
Y	U.S., A, 5,281,092 (SULLIVAN) 25 JANUARY 1994, Figs. 1-22	1-42
Y, P	U.S., A, 5,380,118 (STAHLECKER ET AL) 10 JANUARY 1995	13-21
Y	DE, A, 1,056,624 (LICENTIA) 06 MAY 1959, Figs. 1-2	13-21

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/06925

A. CLASSIFICATION OF SUBJECT MATTER:
US CL :

415/170.1, 182.1, 206, 213.1, 214.1; 277/205; 403/13, 14, 312, 334, 335, 337.